Spondylitis and Rotary Lateral Curvature of Spine—their Proper Treatment practically demonstrated with Exhibition of Cases.

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SPONDYLITIS AND ROTARY LATERAL CURVATURE OF SPINE—THEIR PROPER TREATMENT PRACTICALLY DEMONSTRATED WITH EXHIBITION OF CASES.

By Lewis A. Sayre, M. D., of New York County.

Read November 20, 1885.

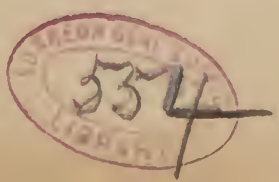
Part I.

Notwithstanding the somewhat abundant literature of spinal caries, I still feel that there is much to be said concerning what constitutes the correct method of treatment.

Before beginning my demonstrations, however, I desire to make a few preliminary remarks regarding the ætiology and diagnosis of this disease. I wish all to bear in mind that it is an inflammation of the vertebræ, and differs entirely from the deformity which arises in lateral curvature of the spine, of which I shall speak hereafter.

The first accurate description was by Mr. Percival Pott in 1783, and in honor of his name it has since been called "Pott's disease"; but, as it is essentially a destructive inflammation of the bones of the vertebræ, I prefer to use the more accurate term "spondylitis" as suggesting its ætiology and location.

With regard to this affection, the causes are predisposing and exciting. Under the former we may class those of hereditary taint, bad constitution, or of strumous diathesis, whether inherited or acquired. Under the head of exciting causes are to be included injuries of whatever nature; and even the vitiated constitution requires more or less of an injury as an exciting cause, and the essential difficulty can, therefore, almost always be traced to traumatism; the injury received may be trivial and



escape attention; the suffering, perhaps not very severe at the start, may be attributed to rheumatism or to "growing pains," and a physician may not see the case until after faith in home-remedies has been lost. All this procrastination does not give an opportunity for an examination until the projection of the spinous processes at some point or another is quite evident. The pains which have been previously complained of are, as a rule, generally felt at the distal extremity of the nerve filaments which have their origin at the seat of disease.

When the difficulty has advanced so far that inflammatory softening and degeneration of the bone have taken place, the weight of the body upon the parts involved will cause absorption most markedly upon the anterior portion of the bodies of the vertebræ, and, as these lose their thickness at this point, the bodies fall together. This causes the spinous processes to assume a peculiarly shaped prominence, which has originated the name, posterior angular curvature.

Now as to the symptoms. These, of course, vary according to the location of the disease in the spinal column, and, bearing out my remark at the start, namely, that the pains are usually felt at the distal extremities of the nerves arising from the spinal cord at the seat of the disease, you will find that if they occur in the cervical region you may notice difficulty in deglutition, choking sensations as of a string around the throat, trouble in the larynx producing a constant hacking cough together with pain in the thorax, also numb sensations in the arms and fingers. If the disease be in the dorsal region, you will often be told of pains in the chest or upper part of the abdomen, with a sense of constriction around the body, complicated with indigestion and difficulties of a like character. Again, should the disease be at the lower dorsal or lumbar region, you may expect to find abdominal pains, flatulence and colic, constipation, urinary difficulties with a sense of girdling around the belly; this condition of affairs may also be aggravated by pains extending down the thighs and legs resembling sciatica, followed in some cases with partial loss of power in the lower extremities.

But in the early stages of the disease these symptoms, fre-

quently so vague, may seem not to be of importance sufficient to demand a stripping of the patient for the purpose of making a thorough examination of the entire body; and you may be thus easily led into the false diagnosis of rheumatism or neuralgia, and, also, as a natural consequence, into errors of treatment.

Having led you to appreciate the importance of attention to details, which in a mere cursory examination you may have neglected, allow me to throw out some hints regarding the most satisfactory procedure. I would suggest that after stripping the child naked you lay him across your lap, face downward, with the arms over one thigh and the legs over the other, and then gradually separate your thighs. When that is done the first thing you will probably notice, if spondylitis be present, will be that the child takes a long breath, a sigh of relief; and this leads me to speak of another symptom which I have omitted to mention. When the child is walking about, particularly if the disease be in the dorsal or lower cervical region, he will breathe in a short, grunting manner, because of the constant effort on the part of the muscles to hold the trunk still. In other words, he is constantly striving after the advantages of a muscular splint on the body to prevent motion in the spinal column. In some cases the pressure upon the intercostal nerves is frequently so great as to produce almost spasmodic respiration. The long sigh exactly expresses the relief afforded by the gradual extension upon the spine, which takes off the pressure from the inflamed parts and reduces the muscular irritation to a minimum. But in your glee at this discovery you must not carry your extension so far as to produce reflex muscular contraction. This condition of comfort gives place to the opposite when you let up on your extension. You may intensify the pain by placing one hand upon the head and the other under the sacrum, and crowding the bodies of the vertebræ together. The instant this is done you will see a spasm probably of both legs and arms, while the child at the same time will scream with pain; but the moment extension is made he will be perfectly easy again.

The responses to these tests may be obtained when the dis-

ease is in the anterior part of the bodies of the vertebræ, or in the intervertebral discs; but it may be that in the case before you the anterior portion of the bodies and the discs have not yet become involved, and yet the patient may be suffering from spondylitis. Consider, then, that when the dorsal portion of the spinal column is affected the disease does not always at first attack the anterior portion of the bodies of the vertebræ, but that the part most extensively involved may be upon the sides of the vertebræ where they form a junction with the ribs. Therefore, you should not be content with examining the anterior portion of the bodies of the vertebræ only, but you must test the sides of the vertebræ by crowding the heads of the ribs against their articular facets. By pressing upon the ribs separately, in the manner here shown, the exact location of the disease may be determined. In some extremely vague cases the use of heat, cold, or electricity may be a valuable aid in the diagnosis of the case, as well as Dr. Seguin's surface thermometer for its sensitiveness in the detection of the slightest elevation of temperature at the seat of disease. Briefly, then, I wish to make these points: spondylitis is the result of injury in almost all cases; that this injury is followed by inflammatory action; and that it may be diagnosticated by extension, counter-extension, and by vertical pressure upon the spine, likewise by pressure upon the sides of the vertebræ; also, added to these, by symptoms referable to the distal extremities of the nerves involved in the disease long before any deformity is apparent; and, being recognized in this early stage, it may, by a correct method of treatment, frequently be cured *without any deformity occurring.*

By the correct method of treating spinal caries I mean the fixation and support of the spine in such a manner as to relieve the diseased vertebræ from pressure, prevent all friction, and thus free the patient from pain, while at the same time allowing him to have the privilege of out-door exercise, and in many instances to follow his daily vocation.

The necessity for calling your attention to this subject is still more evident by referring to an annual report of a public institution in our own city. Although this same institution is

set apart for the especial treatment of this disease and other deformities, and maintained to a certain extent by public contributions, yet the resident physician openly announces in his annual report that those means for the treatment of deformities or diseases of the joints which are recognized by the most intelligent of the profession in all parts of the civilized world are absolutely prohibited from being employed in this institution.[1]

Scarcely a day passes in which I do not receive a patient from some distant section of the country who has suffered months, and sometimes years, of torture from spondylitis and improper treatment. He is immediately relieved from all pain as soon as the proper method of treatment is adopted. All of this suffering might as well have been avoided by a resort to the only correct plan of treatment.

I admit that, as to the proper application of instruments, and the style of instruments required, there may be a diversity of opinion; but as touching the indications to be fulfilled, which I have so decidedly emphasized, there can be no dispute. By giving your patient rest, and relieving the parts involved from pressure both by day and night, you best have gained your end.

The instruments devised for the purposes mentioned are almost without number, and as examples of mechanical ingenuity they are of the highest standard.

Being conversant with the ideas of medical men upon these points, by reason of daily contact with them, and being familiar with the devices alleged to be curative, I have naturally thought much, and have come to very positive conclusions. May I not be competent, also, to speak critically of most of the instru-

[1] For proof of this statement I refer to page 15 of the "Twentieth Annual Report of the New York Society for the Relief of the Ruptured and Crippled," in which it states: "Weights and pulleys to extend the diseased limbs, or plaster jackets, are never used in this hospital, as we believe them to be mere palliatives in treatment, and often injurious."

Such a report emanating from the resident physician in his individual capacity might be harmless, but, with the names of some of our ablest practitioners appended as the "Consulting Board," it can not be regarded in any other light than as exerting a most disastrous effect upon the community. As all these gentlemen are in the position of indorsing the false doctrine, I deem it my duty to expose errors like this to the profession.

ments brought to notice? I pray that you do not accuse me of an undue affection for the plaster-of-Paris jacket, because it is an invention of my own, but let it stand upon its own merits. This jacket must be properly applied—this is essential for success. I speak without egotism, but with authority based upon experience. I have selected a few cases for your inspection, the histories of which have been copied from my note-books.

Case I.—*January 16, 1882.*—J. K., aged three years and ten months; family history good. Patient had severe attack of diarrhœa lasting some months, also has had whooping-cough, measles, and bronchitis. When twelve months old the father noticed a projection of the spine. He consulted an eminent surgeon, who pronounced it spinal disease, and sent him to the Forty-second Street Hospital, where a brace was advised; the child could then stand and walk without support; a brace was applied at that institution and was worn for fourteen months. At the end of that time the child was much worse, and the deformity had greatly increased. He was then taken to another physician, who applied a plaster jacket without the head-rest.[1] This failed to give him any relief, and he was taken to another physician, whose treatment also was not a whit more successful—he applying a broad bandage around the middle of the body, and then rubbing wet plaster of Paris over it—no shirt having been used. This gave the child so much discomfort that he was brought to me, January 16, 1882, unable to stand without assistance, extremely emaciated, and suffering great pain. I applied a jacket and jury-mast on the 18th, and as soon as the plaster had set he was able to walk without assistance, and without resting his hands upon his knees. He continued to improve from this time, and never suffered any pain from the time of the application of the first jacket.

New jackets were applied every few months, as the child's growth required frequent renewals. He has had eight altogether.

Some two months since an abscess appeared in each groin, but they have given him no pain, and apparently have not disturbed

[1] In a child so young as this it is frequently impossible to apply a plaster jacket with jury-mast, because the pelvis is not sufficiently developed to give it proper support. In all such young children the "cuirass with head extension" is preferable.

his general improvement. These were both aspirated but will probably refill. You see that he is now entirely free from pain, and runs around with great activity, notwithstanding the abscess in each groin.

Fig. 1.

Case II.—*May 3, 1882.*—D. F., aged five years; family history good. In August, of 1880, while sliding down the banisters, he fell over into the hall, striking on his head. About three days after the child walked very stiffly; this difficulty kept increasing, and a month from the time of the accident he was taken to the Forty-second Street Hospital, where a diagnosis of spondylitis was made, and a brace applied. At that time the mother states that no deformity was visible, but that two months after the brace was applied a prominence upon the spine was noticed, which has kept increasing up to the present time. He was afterward taken to the Fifty-ninth Street Dispensary, where a Taylor brace was applied without any relief; during that time he was unable to stand, being confined to his bed.

When he came to me he was suffering extremely, and could not stand, even with the brace applied, without supporting himself by placing his hands on his knees, as in Fig. 1, from photograph. The deformity of the spine was very strongly marked, the angle being almost acute in the region of the eighth, ninth, and tenth dorsal vertebræ. I at once applied the plaster jacket without the jury-mast, but was compelled to afterward apply the latter also; the result being that he was freed from all pain, and had perfect use of his legs, and could stand erect without support, as seen in Fig. 2, also from photograph.

Fig. 2.

August 11, 1885.—Since previous date new jackets have been applied from time to time as required, according as the child grew. He is now almost consolidated, and to-day the jacket was applied and made into a corset, as seen in Fig. 3. He is in perfect health and never complains, the disease having been arrested at the very point when he first came under my care, the deformity now existing being the same as it was then.

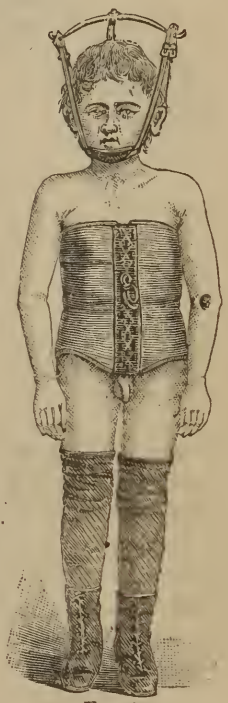


Fig. 3.

At the present time his general health is excellent, and he appears perfectly consolidated, and can walk erect, and concuss upon his heels even when the jacket is removed, as you see ; but I advise him to wear it as a corset for a few months longer, by way of precaution, and shall therefore replace it.

Case III.—*January 15, 1883.*—L. A. G., aged four years and three months. Family history good. One year ago, the boy fell from a chair, striking upon his back, in the upper dorsal region. One month after, he began to walk in a peculiar manner, and the family physician, on examination, found him suffering from spondylitis. In July, 1884, a brace was applied to the child, but the deformity rapidly increased, and he suffered continual pain. Dr. Johnson, of Brooklyn, being then consulted, sent him to me.

On examination, I found him suffering from spondylitis of the fifth, sixth, and seventh dorsal vertebræ, the spinous processes being very prominent. He was suffering intense pain in the stomach and sides, and could not stand without assistance.

I applied a plaster jacket and jury-mast, which, when set, gave him perfect support, and enabled him to walk without assistance.[1]

[1] *January 21, 1886.*—During the time he has been under my care, he has had ten plaster jackets applied, according as he increased in growth. To-day I find him perfectly consolidated, can jump on his heels and bear pressure on the head without causing any pain. His health now is excellent, but I have to-day applied a plaster jacket without the jury-mast, and made it into a corset, as a protection against accident.

CASE IV.—*January 14, 1884.*—M. E. K., aged five years. Parents healthy; no other children. When the patient was two years of age she commenced to run down in her general health, the family physician treating her constitutionally for several months, using internal remedies. He finally called another physician in consultation, and, after a careful examination, a diagnosis of spondylitis was made, the disease being located in the seventh cervical and first, second, and third dorsal vertebræ. They then applied a plaster-of-Paris jacket, without the jury-mast, which failed to effect any good result; new jackets were, however, applied, the mother states, every two to four weeks, until two months ago, when they were abandoned.

When I first saw the child, she was well nourished, but suffering intense pain whenever she took her hand from under her chin. Whether sitting or walking, this was a favorite means of supporting the head. Her customary seat was an arm-chair, because she could curl herself up and rest her chin on the arm of her chair. She could not bear the slightest jar, and ever so slight pressure on the head, caused a spasm over the body; respiration was labored and grunting; this, however, immediately ceased when traction was made upward, under the chin and occiput, her respiration then became more natural, and she would then say "it felt good."

Diagnosis.—Spondylitis of the first, second, and third dorsal vertebræ.

I applied a plaster jacket and jury-mast a few days after, with the result of relieving the child of all her painful symptoms, and she walked out of the office with her hands by her sides, instead of supporting her head as formerly.

January 29th.—New jacket and jury-mast applied, as, for some reason, the last one did not set well and broke down the day after she reached home.

April 5th.—Child at office, has made very marked improvement, suffers no pain at all.

May 27th.—Still improving; in a few days leaves for the country, where she will spend the summer.

September 26th.—During her stay in the country she has had a severe attack of measles; the jacket, however, was not removed, and she is now in excellent health, her spinal trouble being very much improved. New jacket applied to-day.

January 30, 1885.—New jacket applied; the patient is still improving.

April 13th.—She is in excellent health; frolics around with other children and never complains.

November 20th.—Another jacket was applied a few weeks ago, she having worn its predecessor from April up to that time; she is in excellent health, as shown by her present condition, and as you see she has a scarcely perceptible deformity.

Case V.—*May 24, 1884.*—T. L., stone-mason by trade, has always been very strong and robust up to seven years ago, and weighed when at his best two hundred pounds.

Seven years ago he had congestion of the lungs, and since that time he has never considered himself well. Three years after that attack he strained his back while lifting a log, and soon after this went to City Island for his health, since during the previous three years he had been compelled at intervals to give up all work. He now began to complain of his back, saying that the least jar would hurt him very much. He then placed himself under the care of a physician, who treated him for dyspepsia and catarrh of the stomach; at that time he was suffering severely with his back, had cramps and pains through the abdomen; his attendant finally gave the case up, when he came to New York to consult an eminent physician, under whose care he was for three months. He kept gradually getting worse, until at last he was unable to bear the journey to the city. He was then treated for dyspepsia by one of his home physicians, who finally advised him to go to the "Home for Incurables," at Fordham. This was in 1881, when the man could hardly walk, and would fall without a moment's warning, being almost paralyzed in his legs. Whenever he desired to descend the stairs, he would be obliged to assume the sitting posture and work himself down with his arms as best he could. During all of this time the man was losing flesh. He succeeded in getting into the "Home for Incurables" on October 7, 1881, and was there examined by Dr. Campbell, the house physician, who diagnosticated the case as dependent upon some spinal difficulty, and sent for me.

I saw the man on the following Sunday, and upon examination found him suffering from spondylitis of the middle dorsal vertebræ, being almost paralyzed in his legs, and suffering great pain

in his spine and abdomen. I then partially suspended him, which gave him immediate relief, and, while in this position and free from pain, I applied the plaster jacket without the jury-mast; it was, however, worn for only a week, as it failed to afford him the desired relief. I saw him the week following and then applied the jacket with the jury-mast. When this had been properly applied, and the chin-collar carefully adjusted, he was entirely free from all pain, and after the jacket had become hardened was able to walk out-of-doors.

He remained in the Home five weeks after I had applied this jacket, continuing to improve during the whole of that time. He then returned to his own home, as he was able to attend to all his wants, and could take moderate out-door exercise. This jacket was worn for nine months; I then applied another plaster jacket, but this time without the jury-mast, and also made it into a corset so that he could take it off when he wished to bathe. He was at that time very greatly improved but not yet able to attend to manual labor.

Fig. 4.

May 24, 1884.—New corset applied, walked three quarters of a mile, part of the distance to my office. At times he has slight pain in his back, but states that he is better than at any time since the onset of the disease, and can walk up and down stairs like any other person, a feat which he was not able to accomplish for four years.

At the right thigh there is an immense abscess, extending from behind the trochanter major under the glutei muscles to the inner side of the thigh; as yet no signs of it pointing. Returned home with instructions to apply hot poultices to the abscess constantly, and to return again in two weeks.

June 8th.—Abscess ruptured spontaneously, and the patient states discharged about five pints of pus, and the day following discharged three pints more. This seemed to relieve him very much.

July 6, 1885.—Has now worn the last corset for over a year. There is slight discharge from the abscess. A few days ago he returned to his trade. Can now percuss upon his heels without pain, and does not as yet need a new corset.

November 20th.—Slight discharge from the abscess ; general health good, as you see.[1]

Case VI.—*June 7, 1884.*—E. T., four years old ; family history good. The patient was always healthy until she reached the age of two and a half years. Six months before that she had a severe fall over a wash-tub, when, six months thereafter, she began to complain of pain in her back and sides. The parents consulted their family physician, who, on examination, detected spinal difficulty, and referred them to the Forty-second Street Hospital. They took the child there thirteen months ago, and, as advised, had a brace applied. The mother says that then there was but slight prominence visible upon the spine, but that it has been growing more and more marked, until now there is a decided projection of the fourth, fifth, sixth, and seventh dorsal vertebræ.

Three weeks ago patient was brought to me. At that time there were very bad sores on each side of the spine, caused by the pressure of the brace ; there were also slight excoriations on the ilia. She could walk fairly well with the brace ; but when it was removed she was compelled to support herself upon some object. Extension in suspension apparatus at once relieves the child—she says "it feels nice."

I ordered the little patient to be put to bed without brace until the excoriations were healed, when she might return for application of plaster jacket and jury-mast.

June 17th.—The child returned to-day. She can stand without support ; so I decided to put on the jacket and jury-mast as a corset, to be removed once a week for the sake of cleanliness.

July 15th.—Child at office feeling quite comfortable. She has not complained since jacket was applied.

September 4th.—Child at office, still doing well.

January 20, 1885.—Child apparently losing ground. A new jacket applied solid.

[1] *January 4, 1886.*—New corset applied, consolidation complete. I advised the wearing of the jacket for a time longer to guard against accident. Photograph taken to-day by Dr. R. H. Sayre shows extent of deformity. (See Fig. 4.)

June 2d.—New jacket applied, as old one seemed too tight; general condition very poor; she seems to be losing control of her legs, and does not increase in height; she does not, however, complain of pain, and there is no advance in deformity.

Fig. 5.

August 18th.—Growth of child not yet manifest; general condition poor; the pelvis, too, has not increased in proportion to the body, and is so small that it does not afford good support for jacket, I therefore decided to put her in wire cuirass with head extension attached. This was at once done (Fig. 5).

September 3d.—She is again at office; has not complained of any pain since being in cuirass, and looks much better.

November 20th.—Child still improving, and commencing to grow; health good, as you may observe. As soon as the pelvis is sufficiently developed, I shall remove the cuirass and apply the plaster jacket and jury-mast.

Case VII.—*August 11, 1884.*—Wm. Mc——, aged five years and eight months. The father is healthy; the mother's constitution not good. The patient was always well until he reached the age of two and a half years; he then complained of pains in his stomach, and would scream when he was lifted up. The family physician pronounced it "worms," and treated him accordingly, but failed to afford any relief.

When he was three years old the grandmother noticed a small lump on the spine, and was advised to take him to the Forty-second Street Hospital, where the diagnosis of spondylitis was made. While there a brace was applied, the same as is customary in that institution, and which has been worn up to the present time; and the grandmother, who takes care of the boy, states the deformity has steadily increased during the whole of that time.

On examination, I found the boy suffering from spondylitis of

the lower dorsal and all the lumbar vertebræ, with a very sharp antero-posterior curvature at the fourth and fifth lumbar vertebræ, coming off from the sacrum at almost a right angle. He was compelled to support himself with his hands upon his knees, or some object, even with the brace which he was then wearing; the ribs were pressed down so as almost to touch the ilium, making it very difficult to apply the plaster jacket. I, however, was fortunate in getting an excellent support, and so made the jacket a complete success, the child walking out of the office erect and free from all pain.[1]

September 18th.—New jacket applied, as the immense distension of the abdomen has disappeared, and the jacket seemed too loose. He has made a marked improvement, sleeps and eats well, and never complains.

November 22d.—New jacket applied. Patient still improving.

April 7, 1885.—New jacket applied. Patient is in excellent condition.

July 20th.—New jacket applied, and made into a corset for the first time.

November 16th.—New corset applied. Patient in excellent health.

Case VIII.—*December 2, 1884.*—W. W. A., aged three years; the parents as well as the two other children are quite healthy. This boy never required any medical attention, and walked well at two years of age. About this time he fell off the back of his brother, who was crawling along on the floor playing horse, striking on his head. About six months before this, he had complained of pains in his stomach, and at times could not hold himself straight, and would bend himself forward. The family physician pronounced the trouble to be indigestion.

Dr. ———, of Philadelphia, saw the child about a year ago and correctly tracing the difficulty to the spine, ordered him to his instrument-maker, who applied a brace. The deformity, however, kept increasing, and at the present time the boy can not walk unless he has support.

When he was brought to me his condition was as follows: A

[1] As the disease was so low down, I found there was no necessity to apply the jury-mast, sufficient support being secured by the jacket alone; and it has been satisfactory, as shown by the improved condition of the patient before you.

small, but tolerably healthy looking child; suffering from spondylitis of the seventh, eighth, and ninth dorsal vertebræ, with very marked prominence; can not walk without the brace he is now wearing; the abdomen is greatly distended, and the pelvis is not sufficiently developed to allow of the application of the plaster jacket.

Treatment.—To be placed in the wire cuirass with jury-mast and head-rest until such time as the disease is cured or the pelvis suffi-

Fig. 6.

Fig. 7.

ciently developed to allow of the application of the plaster jacket and jury-mast. This treatment was at once adopted. (See Fig. 6.)

July 3, 1885.—General health excellent; he has increased very much in size. To-day I applied the jacket and jury-mast, which are to be worn night and day. After the jacket was applied he could walk a few steps with but slight assistance. Parents returned home with the child the same day.

September 3d.—New jacket applied; the boy is now running all around, and is in perfect health. (See Fig. 7.)

November 20, 1885.—New jacket applied at the Carnegie Laboratory before the meeting of the New York State Medical Association. The boy is in perfect health, and the deformity has not increased in the least since coming under my treatment.

Case IX.—*April 14, 1885.*—M. F., aged four and a half years; parents apparently healthy; they have lost one child from hip disease.

Sixteen months ago this child suffered from a severe cough which lasted six months. At the end of that time the parents thought there was something the matter with his spine. Six months ago he was seen by a well-known physician of this city, who pronounced it spinal disease, and advised the child to be taken to the Forty-second Street Hospital. He remained there for three weeks with a brace. In December, 1884, he was taken to the Thirty-fourth Street Dispensary, where a plaster jacket and jury-mast were applied; but, the apparatus not having been sufficiently molded, the crests of the ilium failed to give both support and relief. The jury-mast was pressing on the top of the child's head, and only served to add to his suffering, because of the improper application of the jacket. Four jackets were applied in that institution, the last two of which I saw, the fault in them being as I have stated. Dr. Gibney, recognizing the difficulties in the case, and the failure of his assistants to afford relief, kindly sent the child to me for treatment.

When he came to my office, the jury-mast was resting on his head; he was holding his head up with one hand under his chin, and appeared to be suffering very much, having a constant cough, with a grunting respiration. The disease I found to be located in the lower cervical vertebræ, with quite a marked prominence of the spinous processes.

April 22d.—To-day I applied the plaster-of-Paris jacket, the boy being partially suspended. I did not, however, apply the jury-mast, but waited until the next day for the hardening of the jacket, so as to be certain to secure sufficient support upon the crests of the ilium. After the application of the jury-mast, and the adjustment of the chin-collar, I gained just enough traction to relieve the pain, when the cough immediately ceased and the respiration became normal. The boy walked home with his hands at his sides instead of supporting his head as heretofore.

June, 1885.—My patient has grown out of his jacket, it being now too tight. It was then cut open and allowed to gape, after having been fortified with another bandage.

September 23d.—New jacket applied before the class at Bellevue Hospital. He is in excellent condition, and never complains of pain.

November 20th.—The boy is still improving, and now walks well, as you see, with a perfectly free respiration, and without a cough.

The plan of treatment adopted in this case, of accurately molding the inside plaster jacket in at the waist and on the crests of the ilium, and then allowing it to "set," or become thoroughly hardened, before applying the jury-mast, is of immense importance, and I therefore beg to call your especial attention to it.

Case X.—*September 23, 1885.*—M. S., boy, one of fourteen children, all of whom, as well as parents, are quite healthy. In July, of 1883, he was brought to me by the family physician, Dr. Rand, for examination. I then found him suffering from the first stage of hip-joint disease. My instructions faithfully followed out by the doctor resulted in a perfect cure. One year ago his physician noticed him limping again, and found him suffering from periostitis and caries of the os calcis of the opposite leg. He made a clean incision down to the bone and scraped out the necrosed portion; this operation had to be repeated, however, before the wound entirely healed.

Not quite four months ago the boy again began to show a little lameness, and kept his head sunk between his shoulders; this continuing for a short time, there followed another consultation with the family physician. He discovered disease of the spine, and advised the parents to again consult me. I found him suffering from spondylitis of the middle and upper dorsal vertebræ. Pressure upon the head or jumping on the floor caused him intense pain; while traction upward, under the arms, chin, and occiput gave immediate relief.

September 25th.—I applied a plaster-of-Paris jacket and jury-mast, before the class at Bellevue Hospital, and succeeded in making the boy perfectly comfortable, as you see him now before you.[1]

[1] *December 1st.*—Mrs. S. brought the boy to my office, stating that "he could not eat enough, as he had grown too big for his jacket." Previous to this last

CASE XI.—*May 13, 1885.*—G. W. N., aged fifteen years. Father, circus-rider, subject to rheumatism. Mother states she was treated in Boston some twenty years ago for spinal disease, and wore a brace for six months, since which time she has had no further trouble.

This boy has had ague ever since he was two years old, has had measles, whooping-cough, and recently intermittent fever, the last attack occurring two years ago. Since that time, he has complained of pain in his back, sides, and limbs. He does not remember ever to have hurt himself, although constantly jumping off his wagon to deliver milk.

I found him to be a healthy boy, with projection of the seventh, eighth, and ninth dorsal vertebræ. Percussion upon the heels increases his pain, while partial suspension relieves him. My diagnosis, spondylitis.

week she said "he had been perfectly comfortable, and had been running around with the other children."

The jacket was at once cut open and allowed to gape a little, after being secured by the usual bandage. I then directed the mother to take him home and bathe him well, and return in two days, when I would apply a new jacket.

December 3d.—Received a letter from the mother, stating "the child was suffering from a severe vomiting caused by over-eating, and that she could not keep her appointment."

December 7th.—The family physician called upon me, saying he had great fear of paralysis in the case of the child, and thought he had symptoms of compression of the spinal cord, as he was unable to stand, and had severe pains in his limbs ever since the jacket had been removed. I directed that the jacket be at once reapplied snugly with a roller-bandage, and a fenestra cut over the prominent vertebræ, in order to avoid any pressure at that point. The head I directed to be supported by the chin-collar and jury-mast.

December 8th.—Dr. R. H. Sayre called at the house to see the child, and found him much improved. The family physician stating that, as soon as he cut the fenestra in the jacket and applied it as I suggested, the pains all disappeared from the legs and he could walk alone again.

December 10th.—Mrs. S. brought the boy to my office feeling much better. A plaster-of-Paris jacket was at once applied with the jury-mast. An hour after he left my office, and it being lunch-time, they visited a restaurant, where (so the mother states) "he ate a large oyster-stew and wanted more. Then he insisted on walking home" (a distance of nearly a mile) "as he said he was all right."

February 1, 1886.—Having again grown out of his old jacket, a new one was substituted. The boy is certainly growing very rapidly. I find that on removing the old jacket, unless he be properly held, he has a return of his old pain, but is at once relieved when the new jacket is applied.

As he has obtained the position of clerk in an office, he asked me if he could not do without the jury-mast. I consented and the next day applied the plaster jacket, carrying it well up and pressing it in at the very top of the sternum, and leaving it on solid. The result was to relieve him from all pain and allow him the next day to return to his duties.

November 17th.—The patient returned to my office in perfect health. As he had grown very much, the mother had cut the jacket open from the sternum to the pubes, and then, letting it gape a little, had secured it with strips of muslin bound around it, over which she had rubbed some wet plaster of Paris, and then, when that had set, he was as comfortable as before.

A new jacket, however, is necessary, as the old one is entirely too small. He can now jump on his heels and bear pressure upon his head without pain, his health is excellent, and cure almost complete.

I therefore applied a new jacket and made it into a corset, and yesterday it was sent to my instrument-maker, where it had the lacings attached; and I now apply it to the boy before you, while he is partially suspended in the apparatus. The boy, as you see, walks as well as any one, and he tells me "that he must catch his train—homeward bound."

Case XII.—*November 15, 1885.*—R. D., aged thirty-eight years; family history good. He has always been robust, and was never absent from his business on account of sickness until December of 1884; he, however, suffered some five years ago from a supposed rheumatism in his back, and received treatment for it from time to time. Ten years ago, while rowing a race, he was struck by an oar in the hands of the man behind him. He suffered severely from this injury for a week, occasionally having a sensation of pain and uneasiness in the lumbar region, which took the brunt of the blow.

In March, 1884, he consulted a prominent physician of New York, who diagnosticated his case as neuralgic rheumatism, and during the succeeding December he was confined to his bed for nine days with pain in his back and sides, and was treated for rheumatism. In the spring of 1885 he was compelled to withdraw from a game of foot-ball in consequence of intense pain caused by his striking upon the small of his back after having

been thrown. This pain never left him entirely, but would be more or less severe according to the amount of exercise taken.

On the 4th of August, 1885, he visited Sharon Springs for the purpose of taking the baths. He took twenty-six baths at a temperature of 100°, remaining in the bath each time for forty-five minutes, and at the twenty-sixth bath he was so prostrated as to be unable to dress himself, and on the following day returned home in a worse condition than before he started. Having reached home he called in another physician, who, after a careful examination, pronounced it spondylitis, which diagnosis was confirmed by an eminent surgeon of New York, who had been called in consultation. The latter advised a Taylor brace with the jury-mast, and informed the patient that he must give up work for three years at least. The brace was applied as soon as made, but the jury-mast was not used. The patient could only wear the brace during the day, as the pain deprived him of sleep at night and also interfered with his respiration. This brace, however, afforded him some relief, and at the end of a week he could walk about two blocks. It was worn for two months, and, finding he had made but little if any improvement since the end of the first week of its application, he called at my office on November 12, 1885, with his family physician, to obtain my diagnosis of his case, as there had been some question whether he was suffering from spondylitis or from rheumatism.

On examination (before the removal of his brace) he appeared to be a healthy man, although he informed me that his usual weight of one hundred and seventy pounds had been reduced to one hundred and forty pounds. The least concussion or jar upon the heels caused intense pain in the small of the back, as did also pressure upon the head. I then removed the brace, and partially suspended him by means of slings under the head and arms, and, when reaching a certain point in my traction, he informed me he was free from all pain ; but it returned immediately when the traction was removed. I gave my diagnosis of spondylitis of the sixth, seventh, and eighth dorsal vertebræ, and suggested the application of the plaster-of-Paris jacket, as I thought it would give him better support than the brace he was then wearing. I advised him to see his surgeon and have him apply a plaster-of-Paris jacket. His family physician, who was present and had observed

the perfect relief that partial suspension gave him, and believing that nothing could so well sustain him in that extended position as the plaster jacket, concurred in my opinion, and they both left my office with the expectation that the former surgeon would carry out the treatment.

R. D. returned, however, not long afterward, stating that the doctor had condemned the plaster jacket as being too heavy, painful to apply, and also as being very filthy. He said that it would breed vermin, and he, in a word, declined to use it; but the patient, convinced by my principles of treatment, had resolved to give my plan a trial, and so on November 17, 1885, I applied the plaster jacket while he was partially suspended, leaving it solid. After it was set he felt almost entirely free from pain, and could walk around the office without supporting his hands on any object and without his canes. On testing his respiration by the spirometer, it was one hundred and sixty-eight inches, whereas with the brace on it was only one hundred and forty-nine. He has now worn the jacket for three days, and says he has had no discomfort whatever. He has come all the way from Brooklyn to this place, and says he is not fatigued, and that riding in the cars gave him no pain whatever, even in the rail-crossings; whereas, before the jacket was applied, he could not bear the slightest jar without suffering the greatest agony.

You now see him walking quite erect, and he concusses upon his heels quite firmly without having the slightest pain.[1]

The immobility of the casing, instead of being objectionable, is decidedly advantageous in the treatment of spinal caries, because it retains the spine in the position in which the surgeon places it, and thus insures against outside interference; there

[1] On December 10, 1885, he attended his office in Wall Street and transacted matters as usual.

On December 29th he was very much improved. I applied a new jacket, as the old one was too tight.

March 12, 1886, I received a letter from him, from which I quote as follows:

"... All my time is occupied at the office; however, I have to report progress and tell you that my mind is much easier since I got back to business. I have found ease and comfort from the 'jacket' since the day I first put it on. My sleep is undisturbed and my strength is gaining daily. ...

"Your most grateful patient, R. D."

can be no meddling on the part of patient, friends, or relatives. It is also perfectly porous, and allows the free transpiration of the insensible perspiration of the body. It fits with such accuracy the outlines of the trunk, both bony and muscular, that no excoriations can possibly occur if the jacket be properly applied, and, in those cases where the jury-mast is applied, the weight of the head is taken from the spinal column, thus rendering any pressure from this source upon the inflamed vertebræ impossible. Many object to the jury-mast on æsthetical grounds, but, although I have sought for an efficient substitute, I have been unable to find or devise one. Some, again, say the jacket is not cleanly, and that it breeds vermin. This remark, as you have already heard, was made to the gentleman standing before you. You may take my word for it that such an allegation is utterly false. If the surgeon, on examining his patient as he ought to before he applies the jacket, finds him infested with vermin, he should see that he is washed, before applying the jacket. Such a patient would be sent out of my office, and ordered to his bath-room, to report on the following day. Here is a jacket which I removed from a lady, the wife of a Presbyterian clergyman, a few days since, and which I had applied upon her more than four years ago, and, as you see, it is perfectly clean, without the slightest sign of vermin or any other filth. Her servant would daily dampen a towel with bay rum, or cologne water, and, with a long whalebone, push one end of it from the sternum to the pubis, and then, taking the two ends in either hand, would draw it up and down, completely surrounding her body, thus keeping the skin in a perfectly clean and healthy condition.

It is not, however, my intention to discuss the merits of the various instruments that have been introduced for the treatment of spinal caries, but to lay down the principles of treatment. I know of no better method than the application of the jacket and jury-mast while the patient is partially suspended. See what you gain for your patient—fresh air and out-door exercise. He needs no drugs, only good, nutritious food. If the constitution be depraved, medicines may be of service, but, as a general rule, they are not required.

In following out this same idea of treatment, surgeons have used various substitutes for the making of these jackets, to take the place of the plaster of Paris, among which I might mention silicate of soda, porous felt, leather, perforated or otherwise, various preparations of paper, or paper with shellac combined, etc., etc. But all these are impervious to the air, and, therefore, interfere with the insensible perspiration, causing a filthy accumulation of moisture and dead cuticle on the inner surface of the jacket. They are also much more difficult to apply, with the exception of the silicate of soda; but this, again, has the disadvantage of being harder to cut off. None of them, as a class, have the merit of plaster of Paris in being so accurately adjusted.

I have brought here this small cylinder, made out of an ordinary plaster-of-Paris bandage. It is closed at both ends, like a drum; but at one end I have made a small hole in order to admit the stem of a tobacco-pipe. Now, to avoid burning my lips, I place a piece of cloth over the lighted bowl, and, by blowing, I here cause smoke to emerge on all sides through the substance of the drum itself. I think that this is a good enough test for porosity.

Among the additional advantages of the plaster jacket may be mentioned non-interference with the respiration, since the position of the patient during the application precludes any compression of the thorax. The silicate of soda device, when adjusted under like precautions, is its only competitor. The spirometer is a witness of the accuracy of my statement. The man before you, indeed, can refute these antagonistical charges, for, previous to the application of the Taylor brace and the plaster jacket, his expiration was one hundred and forty-nine inches, but after its application it gained seventeen more inches. Then, too, he shows a greater oxygenation of the blood.

Besides skill in this matter, a close attention to details is requisite; a slight experience, however, will enable any surgeon interested in his work to apply the jacket accurately and successfully, if the rules I here give are faithfully followed out:

When you have determined to apply the plaster jacket, di-

rect your patient to secure a skin-fitting knitted shirt, long enough to reach to the upper third of the thighs, and such an article is made especially for this purpose—I secure mine from the Bickford Knitting Company, 795 Broadway, of this city. Then strip your patient of all clothing down to a line with the great trochanters, and apply the knitted shirt. If your patient be a female, place inside of the shirt, next to the skin, pads over the mammæ, to form the bust of the jacket and prevent any pressure upon these glands; over the abdomen place a folded towel to allow for the distension of the stomach after eating. If, however, the patient eat a hearty meal before the application of the jacket, the towel is scarcely needed. If, on the other hand, your patient be a male, take two towels, fold them lengthways, and let their width correspond with the breadth of the patient's chest. Over the chest you will need to fold them of extra thickness, to give more freedom to the respiration. The shirt being now fastened over the shoulders, your patient is prepared for the application of the jacket.

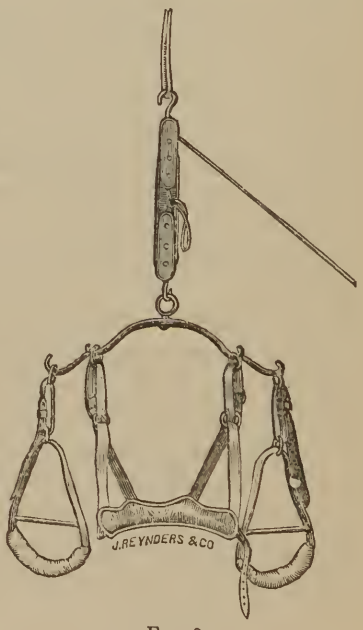


Fig. 8.

The necessaries of the surgeon are as follows: First, block and tackle, with an iron cross bar, from which hang a leather collar and arm-slings (Fig. 8). These are so adjusted upon the patient that, when he stands erect directly under the bar, and traction is made upon the pulleys, the force is divided equally between the head and arms. Thus no strain is brought to bear upon the muscles of the neck if the traction be made at the point of comfort, or, to be more exact, that of entire freedom from pain. To this

I especially call your attention, namely, that your patient is better authority than yourself in this very essential matter, so that, when you reach that point where he tells you he is perfectly comfortable, there stop; and at once apply your jacket.

The plaster-of-Paris bandages are to be previously prepared as follows: From cross-barred crinoline, in three-yard lengths, tear strips of from two to four inches wide, according to the size of your patient, being careful to tear off the selvage edge of the fabric. Then take the best dental plaster you can secure —I purchase mine from the White Dental Manufacturing Company, northeast corner of Thirty-second Street and Broadway; price, $1.25 per can—and rub it into the meshes of the crinoline, upon a long flat table, rolling it as you proceed as you would any ordinary bandage, but with this great difference, that you roll it so loosely (but not too loosely) that the water may thoroughly saturate the plaster. Do not put too much plaster into the bandage, but just see that it is well rubbed into the meshes of the crinoline, and then rub all the surplus plaster off as you proceed.

I am frequently asked how many bandages I use to make a jacket? This depends upon the size of the patient, the width of the bandages, and your thoroughness in the application. For instance, the average adult will require from eight to eleven bandages, but, if they are well rubbed in while the jacket is being applied, the number may be reduced to seven.

I would here especially call your attention to the quality of the crinoline used. I do not refer to the price, as that at nine cents a yard is sufficiently strong for all purposes, but to the substances which the manufacturer uses to stiffen the goods. I find that this has been a frequent source of disappointment to the surgeon. This is the reason why I so often receive letters from physicians in all parts of the country, saying "they can not make the plaster set," although they have sent here to New York and secured the dental plaster which I have recommended. The essential point is, do not have the crinoline stiffened with glue or size if you can avoid it; starch, however, will not inter-

fere with your work. But, if it be stiffened with glue or size, have it washed and then ironed.

A pail with water high enough to cover well the bandages standing on end, an apron to protect your clothes, and, if within a private house, a sheet to cover the carpet, are necessary preliminaries. You now fasten the leather collar around the neck of your patient, adjusting the arm-slings and your traction, as I have previously described. An assistant sitting in front clasps the legs of your patient between his knees to prevent the swaying from side to side, and thus keeps his hands at liberty to aid you in your work.

The manipulator behind the patient, who applies the plaster bandages, begins his work, and, to expedite matters, places one of the bandages on end in the pail of water, and sees that it is thoroughly saturated—which is known by the cessation of the air-bubbles. He drops in the second and takes out the first, meanwhile pressing out the surplus water. He next begins to wind the bandage snugly around the waist of the patient, and with each turn covers two thirds of the one previously applied, carrying it in this manner down below the iliac crests to near the great trochanters, then passing back (always putting a bandage into the pail before removing the previous one) up toward the thorax, and over the mammæ, the assistant rubbing each turn of the bandage into the one previously applied, until a sufficient thickness has been obtained upon which to apply the jury-mast, which I here show you (Fig. 9). The tins on either side of this pass partially around the body of the patient. Being perforated at short intervals, first on one side, then on the other, the burr so produced is imbedded in the plaster bandages,

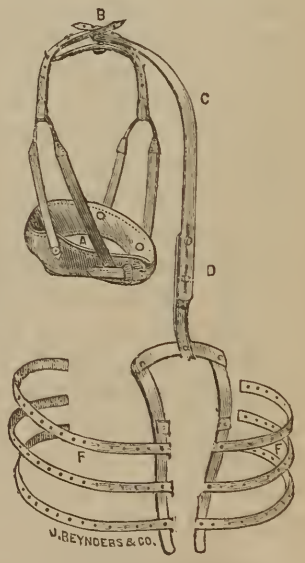


Fig. 9.

and thus the jury-mast is retained in position. Having then bent the jury-mast, if necessary, to fit the exact contour of the back, your assistant holding it in position by the strips of tin which pass nearly around the body, you secure it in such a manner that the rod passes over the center of the head, by a few turns of the plaster bandage, the while rubbing all the bandages well together to prevent any slipping of the jury-mast. This being accomplished, and the plaster sufficiently set, you take the patient under the arms, and your assistant, having removed the arm-slings and chin-collar, then places one of his hands under the buttocks and the other under the legs. In this way, by placing him in the horizontal position, you may lay him upon a soft mattress or air bed, and so avoid any cracking of the jacket while removing him from the suspension apparatus. As he lies thus you may trim the jacket out under the arms, and in front of the thighs, to allow free flexion of the lower extremities. The plaster within an hour or two will be sufficiently set to allow the application of the chin-collar to the jury-mast, and the child may return home, but should present himself on the following day in order that you may see that the application of the jacket is perfectly satisfactory, and that there is no undue pressure at any given point. If you be not satisfied at this visit, arrange to see him on the next day, or indeed for any number of times, until you have made the matter perfectly right. Never let a patient go away the same day unless you are certain that you will see him on the morrow.

This treatment—the application of the plaster jacket—of course only applies to those cases where the pelvis is sufficiently developed to afford a support to the jacket upon the iliac crests. There are cases of course where the jacket can not be applied, owing to the lack of development of the pelvis in very young children. In such cases the child should be placed in the wire cuirass with head extension (see Fig. 10), as I show you in these children now before us (see Figs. 5 and 6), the one patient being undressed, and the other dressed for the street. In each case the head, as you observe, is supported and extended by the chin-collar and jury-mast, the same as in the plaster

jacket (see Fig. 7), the traction being made by a heavy piece of elastic webbing above the head, attaching the cross-bar to the jury-mast. The principle involved in the two methods of treatment is exactly the same. The child must remain in this cuirass until the disease is cured or the pelvis sufficiently developed to apply the plaster jacket.

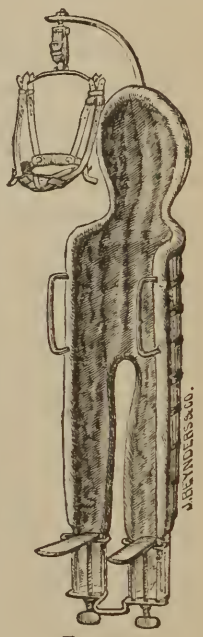


Fig. 10.

In the cuirass, however, the mother can carry the child out in the open air, and allow it to remain there any length of time without any inconvenience, as, being fastened into the cuirass under its clothing by an ordinary roller bandage, it is well wrapped up to guard against the weather. The child may also be placed in the upright position as though it were standing, and, if necessary, may be fastened in this position by the window, or when playing at a bench or table. The principle is precisely the same as in the plaster jacket, traction being made in the long axis of the body at all times by the elastic strap, to prevent pressure upon the inflamed vertebræ. The opening in the instrument underneath, and opposite the anus, avoids the necessity of removing the child from the cuirass to relieve the bowels, since defecation is possible in the horizontal position, over the usual vessel, or napkins may be used in the case of the very young.

Of course as soon as the pelvis has become sufficiently developed to sustain the jacket and jury-mast, if the disease has not been arrested before that time, you may resort to the jacket, as it is preferable to the cuirass, permiting as it does free and voluntary exercise.

PART II.

ROTARY LATERAL CURVATURE OF THE SPINE.

ROTARY lateral curvature of the spine is distinct from spondylitis, as being a curvature of the spine due to unequal action of the muscles on the two sides of the body, and not to any disease of the bone itself. Still, in advanced cases we, of course, find a change in the true anatomical formation of the bones of the vertebræ and also of the ribs.

The rotation, however, which takes place in this deformity is the most important part of the difficulty. You will observe that the ribs, bending at their angles, rest against the transverse processes of the vertebræ. The head of the rib, an inch or an inch and a half from this angle, rests against the bodies of the vertebræ slightly sloping upward. We thus have the ribs at their angles resting against the transverse processes of the vertebræ like a fulcrum, the short arm running to the head of the rib against the bodies of the vertebræ, and the long arm being the body of the rib. The power which moves this lever is the serratus magnus muscle, which is inserted into this long arm. Now, when the trapezius and rhomboidei of one side contract and draw the scapula backward toward the spine, they thus make tense the serratus magnus muscle on that side, and give it full power to act upon the ribs, and by this leverage rotate the spine upon itself.

This is the starting-point of the so-called lateral curvature, but, as it begins in a rotary movement of the bodies of the vertebræ, I prefer to call it rotary lateral curvature. In the lumbar curve the bodies of the vertebræ are usually twisted to the left, while in the dorsal curve to the right. Why this is so I am not prepared to say. This order, however, may be reversed.

When a curve becomes established by the action of one serratus muscle, it is liable to become greatly increased on account of the progressive relaxation of the opposite serratus muscle. Sometimes this curvature becomes so great that one lung is al-

most completely compressed, and the angles of the ribs upon that side may become almost obliterated, while those upon the opposite side become correspondingly acute.

The scapula then being thrown back, bringing these muscles into play, causes the ribs to be bent still further at their angles, and produces rotation of the bodies of the vertebræ: that is the only way in which I can satisfactorily explain the rotation which occurs. Take, for instance, those men who play upon the violin, and in whom we find the most hideous deformities of this character, and which are caused by the position they assume while practicing their profession; the specimen which I here show you (Fig. 11) is that of the spine and ribs of a violinist, who was seen during his life-time by some of the most distinguished surgeons of this city, and by them pronounced a case of spondylitis or true disease of the spine; I differed with them in the diagnosis, and at the death of the man was fortunate enough to secure this specimen and prove the correctness of my opinion.

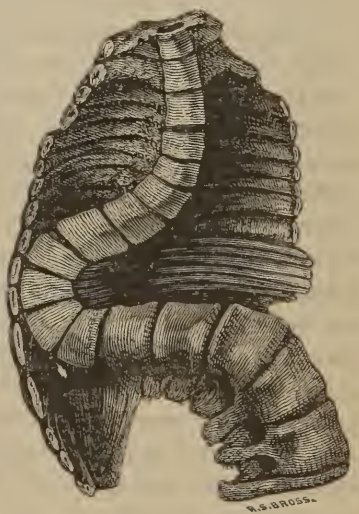


Fig. 11.

You will notice there is no disease of the bone in any part, but the pressure has been so great, owing to muscular action, as to cause partial absorption of some of the bodies of the vertebræ; as a matter of course, when the deformity reaches this stage it is incurable. You also notice the ribs on the left side are overlapping each other, necessarily interfering with respiration.

Half of these deformities are due to want of energy, or rather want of life enough to sit up straight; they are most commonly found among those who make it a habit to loll around with their backs twisted in a half-curved position. Indulgence in such careless habits frequently develops a curve in the spinal

column at some point which is sufficient to establish the deformity, and then in a very short time a second curve will be developed which is compensatory. Again, fracture of the femur with shortening, disease of the joints, congenital shortening of one leg, or paralysis, arresting the growth of one side of the body, are all prominent causes which give rise to this deformity.

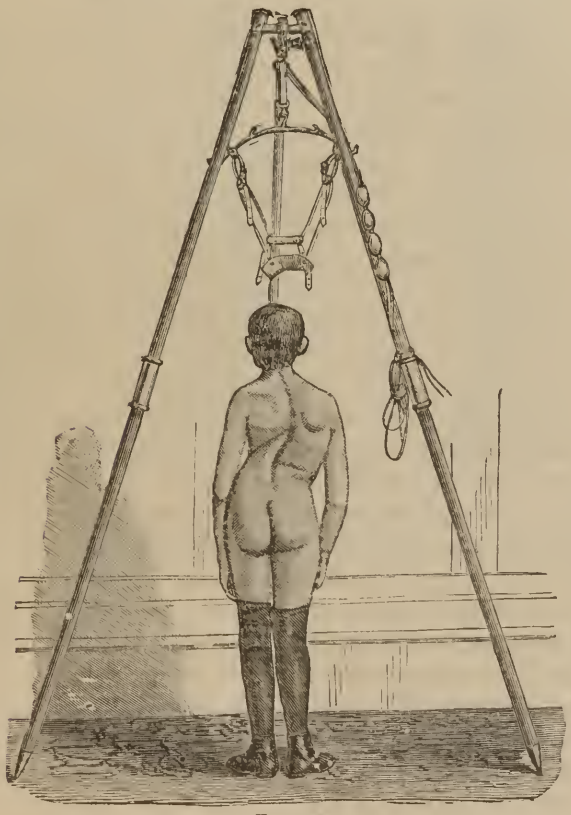


Fig. 12.

It is stated that this deformity occurs much more frequently in girls than in boys; but my impression is that it is developed in boys very much more commonly than is generally supposed; but it is not detected in them so readily, because they are not

so critically examined as girls. I therefore very much doubt whether sex has anything to do as a factor in its development.

It is also stated that the deformity is more frequently developed about the period of puberty, but this is I think a decided error, for, upon a careful inquiry into these very cases, you will find in many instances that the deformity has existed for many years, and in some cases even from early childhood; but no attention is paid to it until the girl begins to develop into womanhood, and comes under the practiced eye of the fashionable dress-maker. I have seen the deformity even in very young children, probably due to some injury to the spinal cord, or central nervous system, causing an arrest of development on one side, thus making an irregular growth of the body.

One of the first things which will be observed is that the lower angle of one scapula is slightly projecting, and this occurs in the very early stage of the deformity; the pelvis also becomes oblique, and you will find one hip more prominent than the other; if you stand behind such patients, their arms hanging at the side, you will notice a marked difference in the space between the elbows and the trunk, even when there is no difference in the length of the lower extremities, as seen in Fig. 12.

Another very important observation is to be made, by which the rotation will be discovered even before the deformity has become conspicuous, and that is, by drawing a line from the umbilicus to each nipple there will be found a difference frequently of from one quarter to one half an inch. This way of measurement I have not seen referred to by any authority, but I think it of great importance in detecting the early rotation.

The suffering arising from this deformity is sometimes very great, the patient being easily tired on the least exertion. Pain, lassitude, and compression of the lungs, giving rise to various anæmic difficulties, are leading features.

The treatment of rotary lateral curvature must be governed by the cause which has produced the deformity, and by the condition of the patient when first brought under notice. If the distortion be dependent upon obliquity of the pelvis, caused by inequality in the length of the lower extremities

(Fig. 13), or owing to a congenital malformation, or from disease of the joints, or fracture, thus causing obliquity of the pelvis, as a matter of course the shortened limb must be artificially increased sufficiently to equalize the length of the two limbs (see Fig. 14), before any

Fig. 13.

Fig. 14.

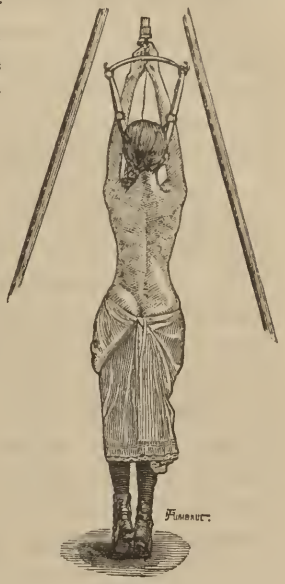


Fig. 15.

other treatment can be effectual. Fig. 15 is Fig. 13 partially self-suspended, showing the effect of this exercise in straightening the spine where curvature exists.

If the deformity be caused by muscular debility, or want of tone in the general system to keep the body erect, we must by proper training, gymnastic exercises, massage, nutritious diet, and tonics, restore lost vitality and increase muscular power. Careless habits in sitting, walking, or standing, must be carefully guarded against, and the vicious tendencies corrected.

When the deformity arises from pleurisy, with adhesions of one side, which has prevented an equal development of corresponding sides of the thorax, it may be very materially relieved by forcible inspiration, while the body is strongly bent to the opposite side, and the arm and hand of the collapsed side are extended to their utmost limit over the head. Another valuable

exercise for patients with this distortion is that of Mr. Bernard Roth, of London, viz., making the patient, in a very loose dress, lie prone on the floor with arms extended at right angles with the body, and the palms of the hands resting on the carpet, with the face turned toward the side of the convexity of the thorax, and the cheek on the side of the concavity resting on the floor. The patient is now in position to commence the first exercise, which is to turn the hands over, bringing the little fingers on the floor and the thumbs upward. The arms, still at right angles with the body, are then to be voluntarily raised as far as possible from the floor, while the head remains in contact with it. While in this position, some one must press upon the feet while the patient raises the head and trunk simply by the contraction of the muscles in the back, without putting the hands to the floor; now, while in this position, he or she must take a deep and forced inspiration, and then drop back into the first position, and rest at ease for a few seconds, after which the same process is to be repeated three times. This course should be pursued every night and morning, increasing the number of movements as the patient's strength improves, being careful never to carry the exercises to the point of exhaustion.

After a few minutes' rest, the patient should place the hand on the side of the convexity behind the back, and seize the buttock of the opposite side with the open palm; then put the arm on the concave side behind the head, seizing the opposite ear with the thumb and fore-finger; next, while the pelvis is still in its position, the upper part of the trunk should be twisted as far as possible around the convex side; the patient, while in this position, should again be compelled to elevate the trunk by the contraction of the spinal muscles, and at the same time should take as before a deep, forcible inspiration, and then return to the position of rest for a few moments. This movement, like the one first described must be repeated three times at first, and gradually increased proportionately to the strength gained.

Partial self-suspension will also be found a most valuable means of correcting the deformity in cases of lateral curvature,

if the principle be properly managed. This is effected by the patient having a leather collar passing under the chin and occiput, two straps passing from this up on either side of the head to an iron cross-bar, secured by means of a rope and pulley to a hook or beam in the ceiling. The patient is expected to

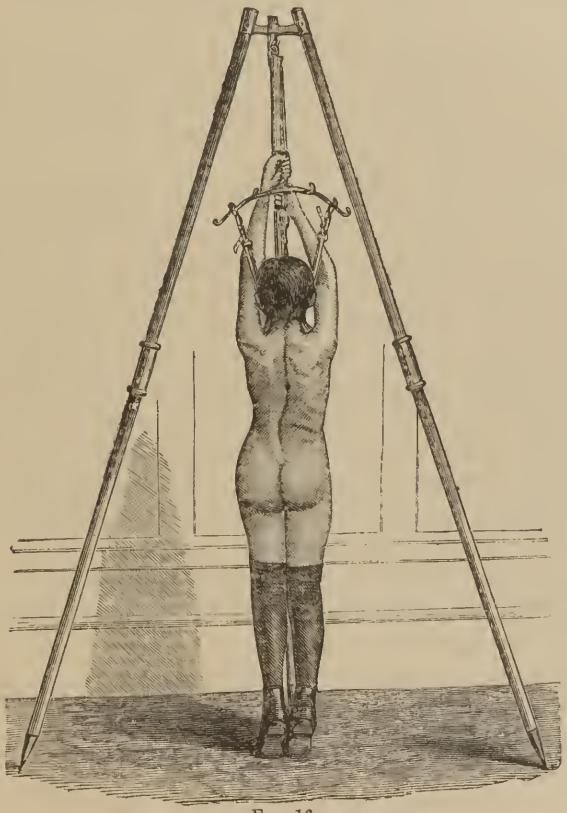


Fig. 16.

raise the arms over the head to their fullest extent, and, seizing the rope in the hands, commence to climb up hand over hand until the heels are gradually raised from the floor, barring the discomfort before this point may be reached ; the toes, however, should never leave the ground. (Figs. 15 and 16.)

The hand on the side to which the concavity of the spine faces should always be the one uppermost when the patient has reached the height where the heels are raised from the floor. While holding herself in this position, the patient should take three full inspirations, then slowly descend until she once more rests firmly on the floor, allowing the arms to fall by the sides and to rest there a few moments; the same course is to be repeated in all three times. For the greater convenience of holding on to the rope, three or four wooden balls should be strung upon it, and secured at a certain point, after the patient has found out the limit of extension.

It is necessary, in the performance of this partial self-suspension, that the patient should always keep the arms extended in a perfectly straight line, and simply make each hand go over the other, and no more, so that the muscles of the trunk, rather than the neck, may bear the strain. The apparatus for this purpose may be arranged in one's own room, and may be used for exercise night and morning three times, as before described, until after some weeks, when the number of imposed tasks may be increased according to the hints already given.

The positive change produced in the existing deformity by these exercises is plainly to be seen by comparing Figs. 12 and 16 and 13 and 15, or in any case in which you may choose to make the test. Very often this deformity is produced by horseback riding, the bridle-hand twisting the body around in the saddle. In such cases you may reverse the pommel of the saddle and ride upon the opposite side. In these cases of lateral curvature a very useful exercise is to stand in front of the patient while she is sitting upon a chair or stool, compelling her to turn and twist the trunk in the opposite direction in which the deformity exists, while you resist this movement. Another exercise is that of sitting upon a stool with the arm upon the concave side raised in front on a level with the thorax, while the arm upon the convex side of the deformity is placed behind the back; then seizing a rubber strap in either hand, the ends of which are secured to staples in the wall or door, the patient endeavors by muscular action to

unwind, as it were, the rotation of the spine, and thus overcome the deformity.

Suspension also may be made from two horizontal bars, as recommended by Mr. Adams, of London, one being from two to four inches above the other—the hand upon the concave side of the curvature of the spine being the one to grasp the upper bar; exercises upon these bars may be indulged in as often during the day as the patient may desire. Rings attached to ropes of unequal length effect the same object.

Yet another exercise is to stand upon a block or box upon the foot of the convex side, and swing the leg upon the concave side, at the same time reaching upward with the arm of the same side, as far as possible, the hand grasping a weight of from two to four pounds, and while in this position to take three full inspirations. This also may be repeated several times daily. Again, making the patient stand erect and bringing the scapulæ together by contraction of the rhomboidei muscles, the arms being placed at the sides of the body, the palms of the hands facing directly forward, and the head held well back, is an excellent posture. A light book kept balanced upon the head, and orders given to march from five to ten minutes, is a good device, for by this means the muscles of the spine are trained to keep the body in an erect position when standing. It is a well-known fact that those people who are in the habit of carrying baskets or weights upon the head never suffer from lateral curvature of the spine. In fact, if children, either boys or girls, with commencing lateral curvature had the advantages of the military drill of West Point, the majority would be cured without mechanical treatment of any kind. Massage, manipulation, with the application of electricity to the weakened muscles of the spine, are also valuable adjuvants to restore their tone and vigor. Notwithstanding that in these cases the horizontal posture should be assumed upon the slightest indication of fatigue, even to the extent of resting several times during the day, it is necessary to guard against the protests of your patient, lest they be only a cover for indolence. You will need all your sagacity to discriminate rightly and without injustice. With a due re-

gard, therefore, for the physical condition of your patient in such exigencies or contingencies, a lounge or reclining chair should be at his or her disposal, even during the hours of study. The chair or stool should have a back for the support of the spine, with a rest for reading or writing attached in front. Sometimes it would be well to tilt the chair a little to the side of the concavity of the deformed spine, for the purpose of compelling those muscles to act more than their opposing fellows, in order to retain the body in the erect position. The chair may be secured in the uneven position by small blocks of wood under the legs of the opposite side.

Strict attention to the rules here given or implied, a nutritious diet, and daily out-door exercise, will generally, without mechanical aids, suffice for a cure in the larger number of those cases where osseous deformity has not occurred.

If, on the contrary, the deformity has been allowed to progress until the angles of the ribs have become abnormally curved, and the bodies of the vertebræ, from undue pressure, have lost their true anatomical conformation, it is very questionable whether these cases may ever be perfectly restored by any kind of treatment. Still, some mechanical expedients may be necessary to keep up the improved condition brought about by the proper hygienic measures, including the frequently interrupted self-suspension, in order that no ground be lost. Some device, which your best judgment may suggest, may be required during the remainder of the life-time.

If the deformity has been permitted to progress until the ribs have become distorted and permanently bent, you can never hope to effect a complete cure, but in some cases even then you may make a wonderful improvement. When the bones have become changed in form, and the bodies of the vertebræ have become partially absorbed from pressure (Fig. 11), how can you do more than mitigate the condition by artificial support?

This brings us to the point of mechanical treatment. For this purpose innumerable devices have been contrived by surgeons, in every country, for ages past; none of these, however, I am compelled to say, have given complete satisfaction. Many of

them have been nothing more than cruel instruments of torture. A woman's strife for a proper form has in many instances made the torture tolerable. I have seen many an example of heroic fortitude perfectly surprising, even with excoriations from the misapplied pressure. I might cite instances where all treatment had to be abandoned until the skin could recover its integrity, or, more properly speaking, could attain a condition possible for an appliance that might in a measure reward our efforts. I have not the time to describe, much less to criticise, these instruments; I have a number here for your inspection, and you are at liberty to examine them at your leisure.

Having carefully tested these various devices for the relief of this deformity, I have finally abandoned them all because of their inefficiency as well as cruelty; and I have for some years past confined myself entirely to the use of the plaster-of-Paris jacket made into a corset, which can be applied by any physician in any part of the world, without recourse to the instrument-maker, and I cheerfully say that it will retain the body in the improved position which self-suspension gives it better than any other device with which I am acquainted. This jacket made into a corset is to be removed at night on retiring.

The patient, then, following out the exercises which I have laid down, the same exercises being pursued in the morning on rising and previous to the application of the corset, can not but be benefited. I beg you to remember that the corset is always to be applied to the patient while in the position of partial self-suspension, otherwise it can not fit, because it was adjusted to the body in the improved position which the partial self-suspension gave it. New jackets may be applied from time to time as improvement in the form of the patient takes place. This may vary by weeks and months in different individuals. I am unable to prognosticate as regards the element of time.

Many adults who have become seriously deformed are never capable of being improved beyond a certain point. These individuals, for comfort and support, are obliged to wear the corset during the remainder of their lives. But many now under my treatment are enabled to pursue their daily vocation who for

years previous belonged to the class of non-producers. They had resorted to every device that had ever been invented.

In the application of the plaster-of-Paris jacket in lateral curvature of the spine, the arm-slings used in spondylitis are dispensed with, unless, indeed, the patient be so weak as to interfere with the self-suspension. Having put on a tight skin-fitting knitted shirt of double the length required for the jacket, and having placed on the mammæ suitable pads according to the size of the glands, you fasten the leather collar around the neck, and then, after pulling on the rope just sufficient to make it tense, you direct the patient to extend her arms above the head and reach up on the cord as high as she can while standing flat upon the feet. Then slip up the wooden balls which are on the cord and tie a knot at that point at which the tips of her fingers touched; you now direct her to grasp the balls firmly with one hand and climb up hand over hand, the little finger of the upper hand resting upon the hand below; this she is to do until the heels are just raised from the floor, thereby evenly dividing the weight of the trunk between the neck and arms. (See Figs. 15 and 16.) You must be careful that the patient be not allowed to bend the arms at the elbows, otherwise the weight of the trunk will be brought to bear upon the muscles of the neck. No injury can occur if the arms are kept straight. Having raised herself to the required height, you must see that the hand upon the concave side of the spine is the uppermost one upon the rope. With your assistant in front you apply the jacket as before described in spondylitis, of course omitting the jury-mast unless the curve is very high up, in which case it may be occasionally required, but such are rare exceptions. In applying the jacket, it is well in those places where the patient is liable to exert the most pressure—as for instance on the concave side—to strengthen it a little by a few extra turns of the bandage half way around. In a few moments the plaster will harden sufficiently to allow the removal of the jacket while she is still self-suspended, this being effected by a section made from the center of the sterno-clavicular notch to the symphysis pubis. A sharp, curved knife—I prefer such as is used for pruning

trees—by dividing both shirt and plaster dressing, well answers your purpose.

In cases of persons who are very corpulent, after the removal of the jacket I cut out a small strip in the front of the jacket on either side at the waist, so that the lacings can be drawn even more snugly than the original bandage when the corset is complete. The strip being cut out at the waist of the jacket, as I have just mentioned, I then bring the cut edges together and bind a common roller bandage around it to prevent it from losing its shape while drying, widening the jacket above and below in order to make the edges meet, should they have overlapped when the center was drawn together. I then carefully pass my hand over the inside of the corset to see if there are any ridges, which are sometimes caused by the patient allowing the hands to slip and the body settling down. These, however, can be removed while the jacket is still soft, by pressing firmly along them with your thumb or fingers; the jacket is then put aside until the next day. The patient having put on a close-fitting shirt, to be worn under the corset, is then self-suspended, and the jacket sprung open, placed around the body, and bound closely together with a common roller bandage. She is then removed from the suspension apparatus, and the corset is cut out under the arms so as to have no pressure in the axillæ, and in front of the thighs sufficient to allow of free flexion of the lower extremities without chafing.

In many instruments which are applied for the relief of this deformity, straps or bands are passed over the shoulders and fastened to the brace, which is secured at the lower part by the pelvis belt, thus preventing the free elongation of the spine which is so essential in overcoming this deformity.

A lateral curvature of the spine can not be made straight without being made longer, as is well illustrated by the preparation I now show you.

In this specimen of the human spine (Fig. 17), for which I am greatly indebted to Dr. A. B. Judson, you observe that there is a steel spring passing up through the vertebral column, the spinous processes being secured by elastic bands on either side, holding

the spinal column perfectly erect. If, however, I press upon the top of the spring, the spine immediately assumes the position of a rotary lateral curvature (Fig. 18), and while held down in that position no amount of lateral pressure can make it straight until you remove the pressure from the top, and allow the spine to become extended. Therefore, any instrument for the relief of this deformity in which there are straps passing

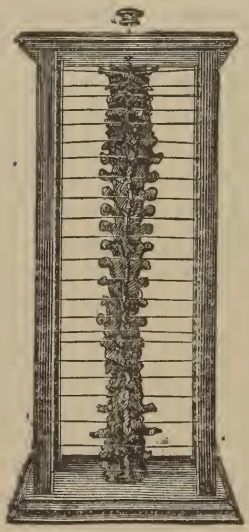


Fig. 17.

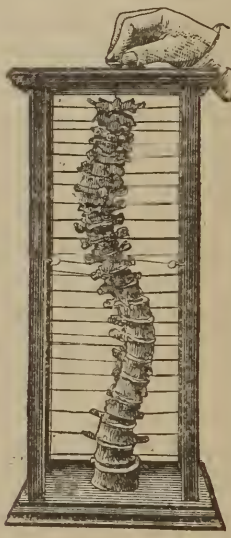


Fig. 18.

over the shoulders, thus preventing extension of the spine, defeats your object.

Again, in the treatment of rotary lateral curvature of the spine, never apply any instrument which curtails the freedom of the arms and prevents the growth of the body upward. For this reason it is that I do not use any support or appendage to the arms. On the contrary, I cut out the jacket under the arms until the patient states it is quite comfortable, and complains of no chafing or irritation. In like manner it is trimmed out in front of the thighs, to allow of flexion of the limbs. A pair of large shears, or a sharp knife, after the jacket is removed, will

enable you to smooth off the cut edges. Now place your jacket near the fire to dry slowly, and, when perfectly hard, send it to some instrument-maker or saddler to have the strips of leather with lacing-hooks attached; or, if confident of your mechanical skill, you may do it yourself.

Fig. 19.

Fig. 20.

I directed you to order the knitted shirt twice the length of the body when you apply the plaster jacket in lateral curvature of the spine. This extra length is now reversed over the outside of the jacket and sewed along the top, covering in all the plaster and giving it a neat appearance.

Leather strips, with lacing-hooks, such as are used on shoes, are sewed down the front of the jacket, the edges in front being previously bound with kid. (Figs. 19, 20, 21.)

This, gentlemen, is a synopsis of what I consider the true therapeutics of spondylitis and rotary lateral curvature of the spine; and I am happy to state that, at the last International Congress, held at Copenhagen, 1884, these views were adopted without a dissenting voice, and even received the approval of their former opponent, Mr. William Adams, of London, in the following words: "The modifications in the plaster-of-Paris jacket which Professor Sayre has recently introduced and exhibited to the meeting seem to have perfected the jacket as a mechanical support. It is not only very much lighter, but, being open in front with lacings, it can be removed at

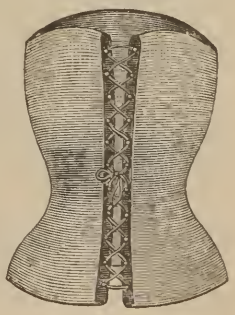


Fig. 21.

pleasure, for gymnastic exercises, etc.; and the patient is never to wear it at night in cases of lateral curvature, so that it can well be applied in this class of cases, to which I considered it was not previously applicable." [1]

The histories of the cases I now present to you are as follows:

Case I.—*January 17, 1884.*—L. S., boy, aged eight years. Parents healthy. Was always thin and delicate, all the other children being strong and hearty. Dr. ——, of this city, saw him in November, 1882, when curvature of the spine was first noticed, and applied a plaster jacket while on a bed in the horizontal position, leaving it on solid. This was only worn for a week, when an iron brace was applied; three braces were successively applied during the next eighteen months, but the mother states that they were constantly getting out of order and that the deformity kept increasing. The parents then brought him to me. At that time his general health was good; he had a very marked rotary lateral curvature, but by proper partial self-suspension the spine could be brought almost perfectly straight, although the rotation of the spine and increased angle of the ribs remained to a certain extent, and will never be entirely removed.

I have applied five corsets to him since January, 1884, the present one, which my assistants are now applying, being the sixth; and you may observe the marked change which partial self-suspension here effects. Since coming under my care he has followed out the gymnastic exercises he has just gone through before you, and there is a most marked improvement in his condition as shown by the photograph taken in 1884.

Case II.—C. A. R., aged twenty-two years. This man typifies one of those unfortunate cases in which the patient, having failed to secure proper treatment in early life, is now compelled to constantly wear the corset. It affords him such support and comfort that he will not take it off even at night; and you will remember I always advise its removal at night, unless in those exceptional cases where they prefer to wear it. At the time I first saw him he was unable to follow any vocation and was

[1] See "Congrès International Periodique des Sciences Médicales," 8me Session, Copenhague, 1884, p. 226.

greatly reduced in strength; but after the application of the plaster corset he began to improve rapidly, and in a few months was able to support himself as a musician, being now a member of one of the theatre orchestras of the city.[1]

Case III.—M. B., aged eighteen years. Patient has been blind, as a sequel of scarlet fever, since she was one year old. Curvature of the spine was first noticed in 1880, and it has continued to increase ever since. Several different kinds of braces have been worn during this time.

I saw her in November of 1882, and found a well-marked double rotary lateral

Fig. 22.

Fig. 23.

curvature. (See Fig. 22.) Partial self-suspension removed the deformity to a great extent. (See Fig. 23.)

I advised appropriate gymnastic exercises, such as she has already demonstrated to you, and also the use of the plaster cor-

[1] *Vide*, case page 505, Sayre's second edition of "Orthopedic Surgery."

set during the day. During the past four years, ten corsets have been applied by me according as the deformity diminished, until as you now see her before you, she presents a spine almost as straight as any one's, the rotation of the vertebræ having also

Fig. 24.

been almost entirely overcome.[1] (See Fig. 24.) Time, however, will not admit of a further demonstration of individual cases; and I do not think it necessary to multiply examples in order to convince you of the efficacy of the plan of treatment which I advocate in these cases.

[1] These three cuts are from photographs taken by the lady's brother, who is a professional photographer.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